MULTIMEDIA **UNIVERSITY**

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FINAL EXAMINATION

TRIMESTER 1, 2019/2020

BFN3174 – FINANCIAL MODELLING
(All sections / Groups)

18 OCTOBER 2019
9.00 a.m. – 11.00 a.m.
(2 Hours)

INSTRUCTIONS TO STUDENTS

1. This question paper consists of **16** pages.
2. Answer **ALL FOUR** questions in **FOUR SEPARATE** Excel spreadsheets in **ONE SINGLE** Excel file.
3. Your Excel file should be named with your **STUDENT ID**, followed by your **NAME**, for example: **1111111623_HISHAM.xls**
4. **SAVE** your answers for all questions in the provided **THUMB-DRIVE.**
5. Please also copy your answers together with formulas onto the given templates of Excel spreadsheets in the **APPENDIX**.
6. Mark distributions are shown in the given templates.

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Using the templates provided in the Appendix of this question paper to model the following 4 questions in the Microsoft Excel:

QUESTION 1 (25 MARKS)

Your aunty, Zoe, just celebrated her 36th birthday yesterday. She has realized that she needs to start saving for her retirement fund. She plans to work until the age of 55 and retire the year after. Based on her family's longevity pattern, she thinks that she will live till 80 years old, during each of these years she desires to withdraw RM60,000 from her retirement fund. Since you have taken the financial modelling course, you want to assist your aunty to achieve her retirement goal. Using the template provided in the Appendix to model the following:

a.   If the annual interest rate is 5%, how much Zoe must save at the beginning of each year till she reaches to her 55th birthday? Assume that from the age of 56, she will make annual withdrawal at the beginning of each year. You are required to use "Goal Seek" function to perform the modelling.

(20 marks)

b.   How much in total Zoe has in her retirement account before she turns to 56th birthday?

(5 marks)

QUESTION 2 (25 MARKS)

FantasticLand Incorporation wants to calculate its overall cost of capital. The company is in the 30% tax bracket. The financial manager has gathered the following information:

Common stock: The company common stock is currently selling for RM20 per share. The company expects to pay a dividend of RM1 per share in the next year. The company's dividends have been growing at an annual rate of 5%, and this rate is expected to continue in the future. The company expects to have RM300,000 of retained earnings available in the coming year. Once these retained earnings are exhausted, the firm will issue new common stock. The new common stock will be underpriced by RM0.4 per share, and the floatation costs are expected to cost RM0.5 pear share.

Preferred stock: The company can issue 10% preferred stock at its RM80 per share par value. The cost of issuing and selling the preferred stock is expected to be RM5 share.

Long-term debt: The company can raise debt by issuing RM1,000 par value, 9% coupon interest rate, 15-year bonds. It must sell the bond at a discount of RM30 per bond and must pay the floatation costs of RM10 per bond.

Continued...

a. Calculate the individual cost of each source of financing.

(15 marks)

b. What is the company's WACC using the weights shown in the table given below?

Sources of Capital	Weight (Wi)
Common stock equity	52%
Preferred stock	10%
Long-term debt	38%
Total	100%

(5 marks)

c. What is the company's WACC using the weights shown in the table given below?

Sources of Capital	Weight (Wi)
Common stock equity	40%
Preferred stock	15%
Long-term debt	45%
Total	100%

(5 marks)

QUESTION 3 (25 MARKS)

DiveMaster manufactures diving suits. The company is going to launch a new production line to produce a smart diving watch. The proposed investment plan are as follows:

- Purchase of a new machine: The cost of the machine is RM1 million and its expected life span is 5 years. The terminal value of the machine is 0, but the chief economist of the company estimates that it can be sold for RM100,000.
- Advertising campaign: The head of the marketing department estimate that the campaign will cost RM50,000 annually.
- The fixed cost of the smart diving watch department will be RM40,000 annually.
- Variable costs are estimated at RM200 per smart diving watch, but because the expected rise in labor costs, they are expected to rise at a rate of 5% per year.
- Each of the smart diving watch will be sold at a price of RM1,500 the first year. The company estimates that it can raise the price of the smart diving watch by 10% in each of the following years.
- Annual production is estimated to be around 1,000 units per year.
- Discount rate applied to DiveMaster is 8%, and its corporate tax rate is 30%.

Continued...

a. Carry out a capital budgeting analysis for this proposed investment plan, using the template provided in the Appendix.

(23 marks)

b. Should this project be undertaken by DiveMaster?

(2 marks)

QUESTION 4 (25 MARKS)

a. Use the Black-Scholes model to price a call option on a stock with the following information:

Current stock price (S)   = 40

Exercise price (X)   = 35

Time to maturity (T)   = 0.75

Risk-free rate (r)   = 7.5%

Standard deviation (sigma)   = 30%

(10 marks)

b. Produce data-tables that show:

(i)   the sensitivity of the Black-Scholes call price to changes in the stock price, S.

(ii) the sensitivity of the Black-Scholes call price to changes in the time to maturity, T.

(ii) the sensitivity of the Black-Scholes call price to changes in the stock volatility, standard deviation (sigma).

Note: please refer to the templates given in the Appendix for this question.

(15 marks)

End of Page

APPENDIX: TEMPLATES FOR ALL QUESTIONS

The given templates in this Appendix are:

1. to be followed exactly when carrying out your modeling in the Microsoft Excel for all of the four given questions.

2. to be used to record answers produced in your Excel spreadsheets for all of the four given questions as follows:

    ' Each resulted value should be recorded on the correct cell as it appears on your actual excel spreadsheet in the Microsoft Excel.

    - Formula for each recorded value should be recorded in the 'Excel Formula' column.

    - Formulas for more than one columns can be entered in one single excel cell under the Excel-Formula column and spaced from one another with a slash sign "/".

ANSWER FOR QUESTION 1 (25 MARKS):

	A	B	C	D	E	F	G	H	I	J
1	INPUT ZONE									
2	Annual withdrawal from the age of 56 onwards									
3	Annual saving till the age of 55									
4	Annual interest rate									
5	Current age									(5 marks)
6	Initial saving amount									
7										
8	MODELLING ZONE									
9										
10	Zoe's Age	Account balance, beginning of year	Deposit or withdrawal beginning of year	Interest earned during year	Total in account end of year	Excel Formula for B column	Excel Formula for C column	Excel Formula for D column	Excel Formula for E column	
11	37									(12 marks)
12	38									
13	39									(3 marks)
14	40									
15	41									
16	42									
17	4?									

ANSWER FOR QUESTION 1 (25 MARKS) (CONTINUED...):

	A	B	C	D	E	F	G	H	I	J
28	54									
29	55									
30	56									
31	57									(5 marks)
32	58									

	A	B	C	D	E	F	G	H	I	J
51	77									
52	78									
53	79									
54	80									
55										

ANSWER FOR QUESTION 2 (25 MARKS):

	A	B	C	D	E	F
1	A. MODELLING INDIVIDUAL COST OF EACH SOURCE OF FINANCING			Excel Formula		
2	Common Stock Equity					
3	Dividend per share (RM)	1				
4	Share price (Po)(RM)	20				
5	Flotation cost (RM)	0.5				
6	Underpriced amount for new stock	0.4				
7	g	5%				
8						
9	Cost of equity (r$_E$)					
10	Cost of new equity (r$_{NE}$)					
11						3 marks
12	Preferred Stock					
13	Dividend %	10%				
14	Share price (RM)	80				
15	Issuing cost (RM)	5				
16						
17	Cost of preferred stock (r$_{PS}$)					
18						3 marks

ANSWER FOR QUESTION 2 (25 MARKS) CONT...:

	A	B	C	D	E	F
19	Long term debt					
20	Corprate Tax rate (T_c)	30%				
21	Par value (RM)	1000				
22	Coupon rate	9%				
23	Maturity period	15				
24	Discounted amount (RM)	30.00				
25	Floation cost (RM)	10				
26						
27	Annual coupon payment (RM)					3 marks
28	Net Market Value (MV)					3 marks
29						
30	Cost of debt before tax (r_D)					3 marks
31	Cost of debt after tax (r_{DT})					3 marks
32						

ANSWER FOR QUESTION 2 (25 MARKS) CONT...:

	A	B	C	D	F
32					
33	**B. MODELLING THE COMPANY'S WACCC**				
34					
35	Before retained earning is exhausted				
36	Sources of Capital	Weight (Wf)	Required rate of return (r_i)	$W_{i}r_i$	
37	Common stock equity	52%			2 marks
38	Preferred stock	10%			1 mark
39	Long-term debt	38%			1 mark
40	Total	100%			1 mark
41					
42	After retained earning is exhausted				
43	Sources of Capital	Weight (Wf)	Required rate of return (r_i)	$W_{i}r_i$	
44	Common stock equity	40%			2 marks
45	Preferred stock	15%			1 mark
46	Long-term debt	45%			1 mark
47	Total	100%			1 mark
48					
49					25 marks
50					

ANSWER FOR QUESTION 3 (25 MARKS):

	A	B	C	D	E	F
1	INPUT ZONE					
2	Discount rate					
3	Corporate tax					
4	Machine cost (RM)					
5	Machine's terminal Value					
6	Machine's life span					
7	Annual depreciation (RM)					
8	Salvage value at the end of the machine's life (RM)					
9	Annual Production					
10	Price of smart diving watch in year 1 (RM)					
11	Annual increase in price					
12	Variable cost in year 1 (RM)					
13	Fixed cost (RM)					
14	Annual increase in variable cost					
15	Advertising cost (RM)					
16						

ANSWER FOR QUESTION 3 (25 MARKS) (CONTINUED...):

	A	B	C	D	E	F	G	H	I
17	MODELLING ZONE								
18									
19	YEAR	0	1	2	3	4	5	Excel Formula	
20	Investment								(1 mark)
21	Total turn-over								(2 marks)
22	Fixed-cost								(1 marks)
23	Variable-cost								(2 marks)
24	Advertising costs								(1 marks)
25	Earnings before depreciation & taxes								(2 marks)
26	Depreciation								(1 marks)
27	Earnings before tax								(2 marks)
28	Tax								(2 marks)
29	Net profit								(2 marks)
30	Machine sale								(2 marks)
31	FCF								(2 marks)
32									
33	NPV								(3 marks)
34									
35	Decision to undertake the project								(2 marks)
36									
37								Total	(25 marks)

ANSWER FOR QUESTION 4 (25 MARKS):

	A	B	C	D
1	**INPUT ZONE**			
2	Stock Price (S)			
3	Exercise Price (X)			
4	Risk-free rate (r)			
5	Time to Maturity (years) (T)			
6	Standard deviation (Sigma)			
7				
8	**MODELLING ZONE**		**EXCEL FORMULA**	
9	d_1			(2 marks)
10	d_2			(2 marks)
11				
12	$N(d_1)$			(2 marks)
13	$N(d_2)$			(2 marks)
14				
15	Call price			(2 marks)

ANSWER FOR QUESTION 4 (25 MARKS) (CONTINUED...):

	A	B	C	D
19	SENSITIVITY ANALYSIS			
20	Stock price	Call Price	EXCEL FORMULA	
21				(2 marks)
22	10			(3 marks)
23	15			
24	20			
25	25			
26	30			
27	35			
28	40			
29	45			
30	50			
31	55			
32	60			
33				

ANSWER FOR QUESTION 4 (25 MARKS) (CONTINUED...):

	A	B	C	D
34	Time to Maturity	Call Price	EXCEL FORMULA	
35				(2 marks)
36	0.25			(3 marks)
37	0.50			
38	0.75			
39	1.00			
40				
41				

ANSWER FOR QUESTION 4 (25 MARKS) (CONTINUED...):

	A	B	C	D
42	Standard Deviation	Call Price	EXCEL FORMULA	
43				(2 marks)
44	5%			(3 marks)
45	10%			
46	15%			
47	20%			
48	25%			
49	30%			
50	35%			
51	40%			
52	45%			
53	50%			
54	55%			
55				
56			Total	(25 marks)